Flight

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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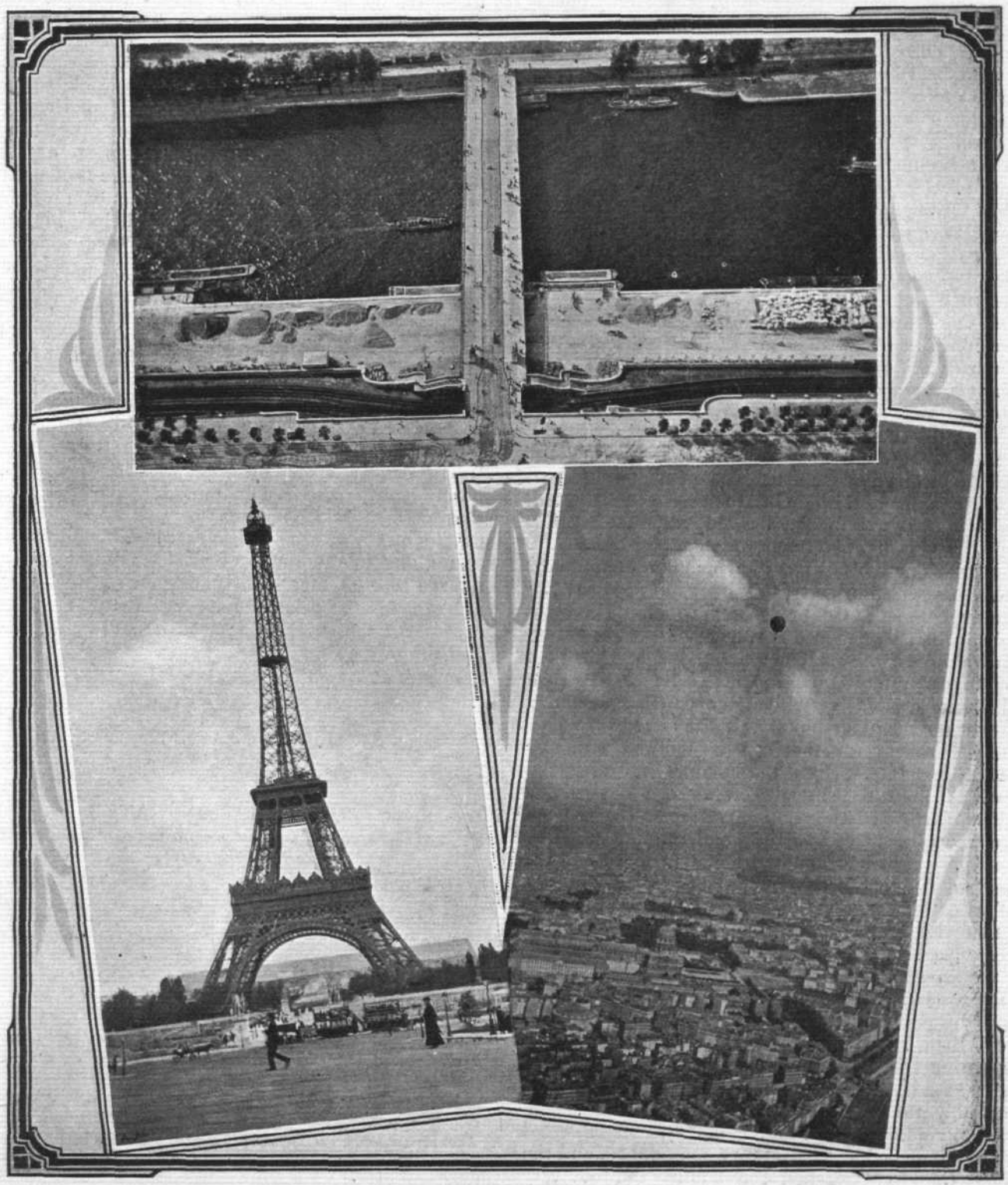

The Eiffel Tower, Paris, and a couple of views taken therefrom during a trip to Rome on a Sizaire by Mr. Percy W. Northey. The top view shows the Seine, and the right bottom photo a bird's-eye view of Paris from the top of the Tower. Note the balloon passing overhead.

ZEPPELIN'S FRESH TRIUMPH.

NOTHING could be more timely than the splendid new record which has been set up by Count Zeppelin for a long distance dirigible trip, and all the world has very rightly joined in showering congratulations upon the plucky aged inventor. The trip is timely for this country, inasmuch as every such reminder of enthusiastic activity elsewhere must bring fresh pressure to bear upon British officialdom, and must help in overcoming public inertia in the United Kingdom. To remain in the air from Saturday evening until Monday evening in a vessel which can accommodate ten men, and to have covered during that period a distance of eight or ten hundred miles, in a more or less predetermined direction, is a feat which is not only greatly in advance of anything else that has hitherto been done in that way, but is an effective and final answer to those who would belittle the practical value of the dirigible on the score of its being an inherently unwieldly monster. For the time being at any rate, Count Zeppelin has done with his dirigible balloon vastly more than any aeroplane has shown itself at all capable of achieving, and has put up a record which might in time of war prove to be the veritable turning-point between success and failure for any great Power engaged in it. It is, perhaps, as well for us as a nation that the culminating triumph of Count Zeppelin was snatched away from him by a cruel fate just as his hands seemed about to be closing round it. Had he succeeded in covering the remaining hundred miles or so to Berlin, when he had reached Leipzig, *viâ* Ulm and Nuremberg, from his headquarters at Friedrichshafen, and in being welcomed there by the enormous concourse of people which had assembled, with the Kaiser at their head, to greet him, it is safe to assume that aeronautics in the Fatherland would have received an impetus of such magnitude that we in this country could ill afford to have been altogether pleased with it from an industrial standpoint. As it is, the degree of success attained ought to be amply sufficient to put the British authorities more keenly upon their mettle than they have been hitherto, for although the severity of the weather compelled Count Zeppelin to retrace his steps southward when he had got as near to his goal as Bitterfeld, and although the final manner of his descent when coming to earth for replenishment with fuel led to a partial wreckage of his vessel, yet the trip has definitely shown that a modern airship of this size is no unmanageable and harmless toy that can be ignored with any degree of impunity. Even the manner in which the airship was able to struggle on after a day's delay during which a hasty temporary repair had been effected must be placed to the credit of the dirigible, for it is quite evident, from the fact that several weeks will be needed to rebuild the bows, that the injury received was of an extremely grave character. It is something to know that with one motor removed, with a great part of the steering-gear cut away, and with a serious loss of gas from the envelope, the outlook of an aeronautic party need not necessarily be at all desperate ; and this knowledge ought, perhaps, to act as a greater spur to further progress than any number of triumphant entries into Berlin during a fairly favourable spell of weather.

The precise details of Count Zeppelin's latest journey will probably not be known to the world for some considerable period, even if they ever come to be published at all. Accounts concerning it vary a good deal, and the telegrams that have reached this country indicate very clearly that there is no keen anxiety on the part of those who are in the know to circulate more definite information than is apparent on the surface. There is, of course, nothing that can be taken exception to in this, and, indeed, the Count and his friends would be very foolish indeed if they gave the full value of their experiences to an expectant world at a time when exact knowledge of the kind is worth so very much to its possessors. The report which will be found in FLIGHT this week gives the main facts which were observed in connection with the flight, and indicates the nature of the trip in a form that is likely to prove useful for future reference. The why and wherefore of what was done by those in charge of the ship is, however, purposely left out by us in view of the many wild conjectures that have been put into circulation during the week; and, as regards the extent of the damage that has been sustained by "Zeppelin II," it is impossible to give any explicit information at present. None of these things have the slightest influence upon the moral of this latest Zeppelin triumph. Germany possesses an enthusiastic inventor whose seventy odd years have not prevented him from firing the imagination of his own people, and whose sheer pluck and determination helped him to meet with that great catastrophe of last year which subsequently led to his securing the voluntary financial backing of the whole German nation. Already Zeppelin has proved to be one of the best assets to which the Fatherland can lay claim. And hence the question is but a natural one: How long is Great Britain going to be content without her Zeppelins? What this old soldier has done for his country could easily be done by hundreds of younger men on this side of the German Ocean. Nor is it either the skill or the desire that is lacking amongst our own people. And surely it can hardly be the mere cost in pounds, shillings and pence that permits other nations to take the lead in new developments with so much ease! The money itself is as nothing to thousands of patriotic Britons. But it is the sad lack of interest in science for science sake, or in progress for the sake of industry in the abstract, that causes the United Kingdom to be still waiting for her Zeppelins.

FLIGHT.

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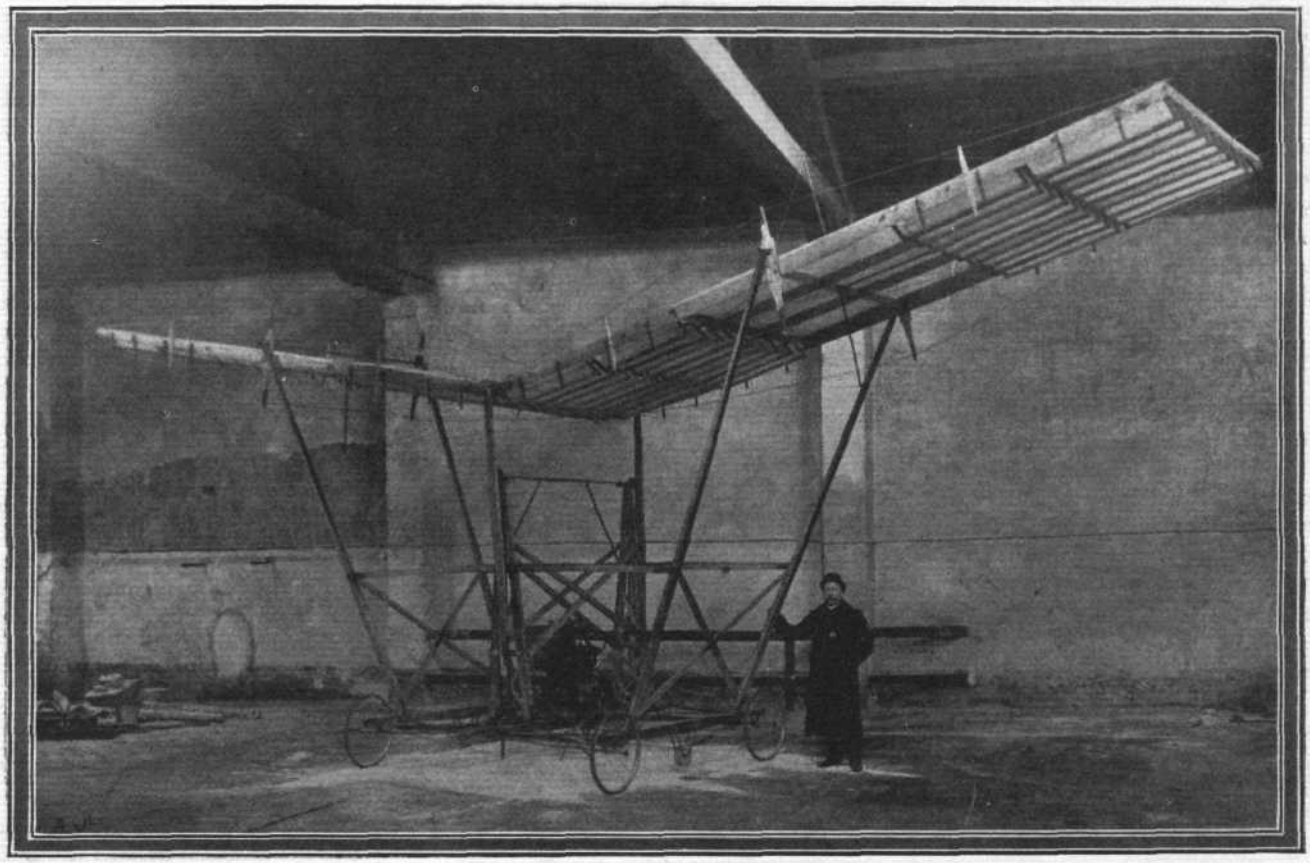
THE COLLOMB FLAPPING FLIGHT MACHINE.

AN extraordinary apparatus, of which we give an illustration, has been constructed by M. Collomb, of Lyons, with the object of achieving flight on the flapping wing principle. The moving planes, of which there are two, rock upon fulcrums, and are so hinged together that they can be operated simultaneously by the engine. As will be gathered from our illustration, an extremely long stroke is required in order to produce the sea-saw motion of each wing about its fulcrum, and the method in which this has been accomplished is primitively simple.

The engine, which is mounted low down in the main framework, has a chain pulley on each end of its crank-shaft, and these drive very long chains which are supported by corresponding pulleys overhead. Anchored to each chain is one end of a long wooden connecting-rod, the other ends of which are attached to the hinge between the two planes above. When the chains are in motion they carry the connecting-rods bodily with them, and these impart a reciprocating motion to the flapping planes, which consequently rock about their fulcrum points. The greater portion of the surface of the planes is formed by pivoted louvres arranged after the manner of the laths in a Venetian blind. These laths automatically close on the downstrokes and open to let the air freely through them on the upstrokes, and the inventor of the machine confidently anticipates being able to keep himself aloft in the air by this means.

The stretch of the wings measures 12 metres, the total surface is 24 square metres. The engine is rated at 40-h.p.



THE COLLOMB FLAPPING FLIGHT MACHINE.—General view, showing the inner ends of the planes approaching their lowest position. The motion of the planes is derived by the direct attachment of wooden connecting-rods to long chains, which are driven by the engine.

The Cross-Channel Flight Prize.

FROM Boulogne comes the announcement that an attempt is shortly to be made on a Voisin machine to cross the Channel, the actual aviator being given as Mr. Arthur Seymour. Major Hill is associated with the arrangements, and a number of motor boats, including the "Bellissima," are to be in readiness to give assistance during the attempt. The village of Ambleteuse, between Boulogne and Cape Grisnez, is the suggested starting point for the flight. As Mr. Seymour is only at present reported to be starting practice, it is doubtful whether his confidence is justified in suggesting that he will be able to make the attempt within a fortnight. He is, however, said to have gained proficiency from trials carried out in secret.

The Wright Brothers in a Police Trap.

AMONG the exploits of the Brothers Wright it has just transpired that they had the thrilling experience of falling into a police trap while being driven from the Aero Club's ground at Shellbeach by their namesake, Mr. Warwick Wright, who was summoned on the 27th ult. at Greenwich for having driven over a measured furlong in Shooter's Hill Road, Blackheath, at a speed of 32 miles an hour. Mr. Warwick Wright was represented by counsel, Lord Tiverton, who objected to evidence of a previous conviction being tendered in defendant's absence. The magistrate declined to deal with the case as a first offence, and adjourned the hearing for the attendance of the defendant.

ZEPPELIN'S LATEST RECORD.

By the remarkable trip made with "Zeppelin II" at Whitsuntide, when a distance of some 800 to 1,000 miles (said to be 940 miles) was covered before returning to earth, and when the vessel remained in the air from the Saturday evening until the Monday morning, Count Zeppelin once more established a record for the dirigible balloon.

This performance is all the more creditable in view of the strong winds which prevailed during the trip, for although a change in the direction of the wind was evidently responsible for the return journey being commenced on Sunday evening at Bitterfeld, when only within a hundred miles or so of an anxiously waiting Kaiser and public at Berlin, yet a considerable amount of battling against the elements must have been involved hour after hour at a stretch. Even the unfortunate accident which was met with when endeavouring to effect a landing near Göppingen for the purpose of replenishing the supply of fuel for the motors has by no means neutralised the moral effect inevitably produced by so notable a journey in the air. The worn-out condition of the crew is quite likely, as alleged, to have been fully accountable for the collision with a tree when coming to earth, and it is said that the steersman utterly failed to notice that it stood in the way. That repairs should have been effected to the stoved-in bows, and that a restart should have been possible after the loss of so much gas from the torn envelope, thus enabling the ship to struggle on the following day towards her home at Friedrichshafen, with a reduced crew, with but one motor, and in other ways lightened, proves at least that a huge dirigible of this character is not nearly so vulnerable as has been assumed by many people, even if it will be some few weeks before the whole extent of the damage to "Zeppelin II" can be made good.

The total time given for the trip from the start on Saturday up to the moment of reaching the ground on Monday is given as being 37 hours 55 mins.; and apparently the course which was followed was in a more or less bee-line from the factory on Lake Constance towards Berlin—*i.e.*, in a N.N.E. direction. It was not generally known that any long-distance journey was under contemplation, and indeed the new vessel had only left the stocks two or three days previously. Some kind of an endurance test was thought to be intended, and to this end the crew was diminished below its normal complement of ten men in order to enable more fuel, stores and ballast to be carried. After getting away at 9.45 p.m., the town of Ulm is said to have been passed at 2.30 a.m. on Sunday, Nuremberg to have been reached by 8.30 a.m., and Leipzig by 4.45 p.m., the wind during this time having been more or less favourable, although inclined during the morning to veer round from south-west to the westward, and to be accompanied by some severe downpours of rain.

Then it would seem that a stiff contrary wind must have begun to be encountered, for it was half-past seven before Bitterfeld was reached, and that was the nearest point achieved in a northerly direction. Then, too, it was that all Berlin was scampering out to the south-western fringe of the city, where the Kaiser was in readiness on the Tempelhof ground with his mobilised troops and the German airship battalion. But Zeppelin was by now heading almost due south-west, and by nine o'clock that night was passing over Weimar.

It had evidently become a question of making for home as speedily as possible, and also of obtaining a fresh supply of petrol if opportunity presented itself. Travelling with the wind all night, Wurzburg was passed at 4.45 a.m. on Monday, and Heilbronn was reached shortly after eight that morning. Appearances go to show that that was about the spot where the situation became sufficiently serious for some drastic measures to be taken. To continue along the same line would be to pass far away to the west of Lake Constance; but to strike off on a south-easterly course would be to expend a considerable quantity of the fuel which had now become so precious. The latter plan was evidently that which had to be adopted since there is good reason to suppose that the wind was freshening rather than abating from the N.E. Fortunately the worst of the flight was over shortly after the ship arrived over Stuttgart, and indeed, at that town, one or two skilful manœuvres seem to have been executed for the delectation of the assembled populace. A more easterly course still then became possible, and it was at one time thought that a descent was about to be made on the sandy ground at Untertürkheim.

After descending close down to the river in this "Mercedes" suburb of Stuttgart, a quick ascent was again made to a height of some 250 ft., and the ship then travelled on up the valley of the Neckar, past Esslingen at 9.45 and Plochingen at 10.15. But little later the attempt to land was made just outside Göppingen, and then it was that the mishap occurred which resulted so seriously. Some accounts attribute the collision to a sudden gust of wind, while others blame the steersman for failing to observe the pear-tree into which the bows of the ship crashed with terrific force. Whatever the cause, two of the sections of the envelope were torn open, allowing the gas to escape; and the aluminium framework in the bows was smashed away for a considerable distance back. Help was soon forthcoming from the immediate neighbourhood, and the work of effecting a temporary repair was put in hand without delay, but it was evident from the first that only the after motor would be available for

Sketch map showing the route of the Zeppelin airship, which started on Saturday evening last about 9.40, and travelled as far north as Bitterfeld, where it commenced its return journey, ultimately being damaged at Goppingen, about mid-day Monday, when within a comparatively short distance of its home on Lake Constance.

continuing the homeward run, and Count Zeppelin was naturally anxious that not a precious moment of comparative calm should be lost in doing work that might be postponed.

From noon on Monday until half-past three on Tuesday afternoon the temporary repairs were being pushed through with dispatch, certain parts being obtained by motor car from the Zeppelin works at Friedrichshafen, but the greater portion of the material employed was improvised for the occasion. The whole of the forward steering apparatus had to be removed in order to lighten the ship, and owing to its damaged condition, while only the after motor could be used for the attempt to complete the journey. A fair degree of success attended the remarkably smart work carried out under these very trying conditions, for the airship had struggled along at an eight-mile gait to Schemmerberg by 10 o'clock that evening, and had alighted safely in a meadow for fresh supplies of gas and fuel.

It was rather an exciting time for all concerned from the moment of leaving Göppingen until the conclusion of the homeward journey. Before leaving Schemmerberg everything that could be spared had to be thrown overboard to keep the vessel afloat in view of the great loss of gas, and even the large trimming-weight used for maintaining a level keel had to follow the superfluous petrol and the water-ballast earthwards, necessitating the painful and monotonous crawling to and fro between the fore-and-aft cars of a member of the crew who has to act as a human counterbalance weight.

During these last stages of the voyage the ship was in charge of Count Zeppelin, junr. (nephew of the Count), and of the engineer, Herr Dürr, the inventor himself keeping in close touch all the time by means of his motor car. He was, in fact, present superintending operations when the landing was effected at Schemmerberg; and had the final satisfaction of seeing his world-famed dirigible arrive back at Friedrichshafen at six o'clock on Wednesday morning. With reasonable luck, he hopes to have his ship repaired in two or three weeks from now, and to avail himself of the welcome that will again await him at Berlin at the end of August.

MERITS AND DRAWBACKS OF THE ZEPPELIN "RIGID" SYSTEM.

Pros and Cons of their Construction and Navigation.

No one reading of the new Zeppelin airship record and the mishap which terminated it, on Monday, can fail to find a thought of sympathy for the veteran inventor in the hour of his disappointment. Hardly ever has the aged Count been spared the gall of partial realisation; yet the determination with which he continues to carry on his work is ever unwavering, and the whole world can well afford to revere the man who sets such an example.

Value of the Trials.

There are, of course, not wanting critics of his principle of airship construction, some of whom are inclined to go even so far as to say that the whole thing is a waste of time and money. But it is, we think, very unfair to say that of anyone who has succeeded as far as Count Zeppelin has succeeded, in demonstrating his ideas in a practical form. There is, of course, a distinct and important difference between the points of view from which experimental aeronautics may be regarded, and when the national standpoint is adopted, arguments are apt to be based upon the assumption that any deviation from the direct evolution of the best type is undesirable. From the scientific standpoint this is by no means the proper way to look at things, for properly conducted experiments in any branch of a subject are of the utmost possible value because they illuminate an hitherto obscure face. That light which such investigations throw upon the details coming under their rays lasts for ever as a guiding beacon indicating safety or danger, as the case may be, to all future generations. Slowly but surely can the whole field of the science be in this way mapped out, until man knows definitely the lines of least resistance along which he may attain to any specified object.

Count Zeppelin's Object.

Now Count Zeppelin's primary object is on the face of it to achieve long journeys, and this desire splits up into two practical problems: (1) the building of a suitable airship on a sufficiently large scale, and (2) its navigation under ordinary climatic conditions. These two aspects are, of course, intimately related to one another, but it is convenient at any rate to bear in mind their partial distinction. As the best solution for the construction of a very large dirigible, Count Zeppelin adopted what has come to be tersely known as the "rigid principle," that is to say, he builds a cylindrical cage of aluminium divided by transverse partitions into a number of compartments, each of which contains a separate balloon or gas-vessel. The whole is then suitably covered by an envelope of fabric. Having thus overcome the mechanical difficulties of the problem, and that in itself has been an achievement for which Count Zeppelin and those associated with him in the work deserve high credit, it has remained to demonstrate that the airship itself is reasonably useful.

Landing, a Navigation Problem.

This has been Count Zeppelin's great difficulty. He has shown that, while the weather is calm, his airship will fulfil all the requirements for which it was designed, and to this extent he deserves the palm of success, for in a task of such magnitude many would have courted disaster at far earlier stages. On the other hand, the Zeppelin airship, as a series of mishaps have shown, is most liable to damage if any attempt is made at landing in high winds. Now the fact that danger has so far only been associated with the landing is of no moment, because while the weather remains windy the airship, in order to remain aloft, must keep under power, and consequently, sooner or later, its fuel supply will be exhausted and a descent be rendered necessary. This was, in fact, the precise cause of the latest mishap. It follows, therefore, that for an airship to be a complete success it must be capable of landing without damage in winds such as are likely to be met with during a voyage of the duration of which the airship itself is capable. The hypothesis in Count Zeppelin's case is that the journey shall be long, and, of course, the longer the journey the greater will be the time available for the weather to change.

Forecasting the Weather.

The science of meteorology is in itself hardly yet so far advanced as to be able to provide an accurate forecast of the precise condition which will

prevail along a specified route during a specified period exceeding more than a very short duration, and in any case the long stretches of calm available in the course of a twelvemonth are remarkably few and far between, so that it can hardly be said that an airship is successful unless it is capable of meeting the average maximum change comparable with the prescribed duration. Now whether the conditions under which the Zeppelin mishaps have occurred are regarded as severe or otherwise, it is nevertheless a fact that they have occurred during periods which have been chosen by Count Zeppelin himself, and if they are severer than he expected, he cannot for that reason say they are severer than they ought to be, because the weather will not change or remain calm to order. It remains, therefore, either for the inventor to admit that his design is not reasonably assured against serious damage in practical use, or that in the demonstrations which have been given with it the handling of the craft has been unreasonably inexpert.

Necessity for a Trained Crew.

In this last mishap Count Zeppelin is reported to have blamed the helmsman for the collision with a tree. It is true that everybody had presumably been awake for 38 hours continuously, and it is probable that the whole crew were so tired as to be far from efficient in meeting the emergency, and here again the problem is in conflict with nature, for man requires sleep, and either he must be relieved from his post or his duties must be in keeping with his state of fitness. It is only reasonable to suppose that the helmsman on this occasion had difficulty in keeping his course while landing. He would hardly have run into the tree in calm weather, for in that case he would not have been selected for such a responsible post. It may be assumed, therefore, that he was a good average helmsman at least, and that his faults might be expected of others with a similar training. The situation, as far as the navigation of the Zeppelin airship in its present form is concerned, therefore, would appear to resolve itself into the question, "How long will it take to train a crew which can land the airship in safety under average bad conditions?"

The Military Aspect.

All problems associated with the navigation of the air by dirigibles have a primary aspect associated with military work, the exigencies of which are oftentimes so acute as to permit of the adoption of a partial solution. If, for instance, the nature of the damage likely to be caused in descent is not great, then for military work such a machine may still possess a positive value. It is on this question that the critics of Zeppelin's rigid principle of construction base their chief arguments. They point out that the airship must be prepared to descend on land, whereas it is primarily intended to descend on the surface of a lake, and they further point out that the impossibility of deflating the envelope owing to its rigid construction leaves the vessel no harbour of refuge from the storm, even when it has descended in safety. So far as the mishaps which have occurred to the Zeppelin airships in practice are concerned, it must be admitted that they have been of a very serious character. The damage done almost always seems to be extensive, and ever liable to extension while the airship remains unsheltered. Assuming, therefore, that the Zeppelin construction represents a reasonable state of perfection on the mechanical side, it becomes a question for any Government contemplating the adoption of the type officially as to what precautions can be reasonably taken to minimise the risks.

The Problem of Aero-docks.

To a nation, airships, like warships, have a certain value, and just as a nation builds harbours, so will it have to build aero-docks. In practice, a vessel on the sea can weather the majority of storms, and a nation's shipping does not therefore have to run for safety on the first signs of bad weather. But the harbours are necessarily reasonable in number and size compared with the vessels afloat. With airships of the Zeppelin type it is a question whether such would be the case. The weather, which is the same aloft as on the surface of the water, offers greater difficulty to aerial craft than those which float upon the sea, and in consequence the proportion which would have to stay in dock would be far greater. In fact, so far as can be seen at present, there would be many days when of the aerial fleets belonging to the entire Continent of Europe not one would be afloat. If, therefore, the development of aerial navies assumes the magnitude which is already prophesied for it, it would seem likely that the docking of rigid airships might become a very serious problem indeed, so that even when looking into the future, advantages would seem to be associated with some more readily collapsible form of envelope.

Latest Bleriot Monoplane, which is fitted with a 35-h.p. 8-cyl. E.N.V. Motor.—This new flyer differs, it will be noted, in several respects from previous designs, especially in the tail.

JUVISY AERODROME FLIGHT MEETINGS.

ALTHOUGH from beginning to end the first meeting at Port Aviation was a disappointment, the organisers in no way lost heart, and their confidence has been more than justified in the result. On Saturday last the second fixture was carried through, and this time with unalloyed success, considering the entire novelty of the whole proceedings. Everything that admirable management could do was brought to bear to prevent a repetition of the previous meeting's ill-success, and altogether there were no less than nine successful flights made during the evening proceedings, lasting three hours.

Not unexpectedly, M. Delagrange was the principal contestant in the various events, although there were three aviators who took part—all on Voisin machines, fitted with 8-cyl. Antoinette engines—for the circular kilometre prize founded by the Société d'Encouragement a d'Aviation. The prize of 1,000 francs was secured by M. Delagrange, who flew the kilometre in 1m. 40⅗s. M. De Rue was only 1 sec. longer, viz., 1m. 41⅗s., he being adjudged the second prize of 500 francs. M. Rougier was less speedy, being third in 1m. 53⅖s. Subsequently De Rue also secured one of the 500 metre prizes offered by the Aero Club de France.

M. Delagrange, during his first flight round the huge arena, was called upon to exercise very considerable skill by reason of a sudden gust of wind, which drove his machine towards the grand stand. By very clever handling he was able to steer his biplane clear of the fencing and regain the prescribed course, taking up once again the proper line for completing the second turn round the aerodrome upon which he was engaged, his time for this latter circuit being, including the detour, 1m. 45⅕s. Shortly afterwards, when the wind had somewhat dropped, he again flew over the circular kilometre, making the best time of the meeting, in 1m. 40⅗s.; again, about five minutes after, making a third flight, in which he flew the first circle, at 7 metres high, in 1m. 50⅕s., and a second, at 12 metres high, in the total time for the two of 4m. 8⅕s. Later, M. De Rue flew the 500 metres as noted above, followed soon after by Rougier, who, however, upon this occasion kept to the straight line. M. Delagrange, at 7.35, again took the air, this time immediately rising to a height of about 10 metres, covering at a good speed two circuits of the aerodrome, and for the third circuit rising with his machine to about 15 metres high, a performance which elicited the enthusiasm of the spectators. Rougier again followed, and was a little bit more at home on the machine. After following a straight line he succeeded in flying the circular kilometre in 1m. 53⅗s., the two kilometres being covered in 3m. 53⅕s., he coming back to earth, however, before the finish of his third circuit. De Rue afterwards, at 7.50, made his attempt for the circular kilometre, his time being 1m. 41⅗s., a second circuit following without coming to earth. By way of a finish up, Rougier, who was very dissatisfied with his performance, made one final flight at 8.45, when he made a complete circuit of the aerodrome at a height of 3 metres.

On the following day, Sunday, another successful gathering took place. In M. De Rue, M. Delagrange found a dangerous rival for the best time, the two flying repeatedly and bettering their times almost upon each occasion during the evening, Rougier also taking a minor part in disputing the prizes offered. Delagrange ultimately proved the victor for the Ch. Stern prize. Delagrange was flying several times at a height of fully 15 metres, whilst De Rue kept to about 8 or 10 metres. So keen was the contest between Delagrange and De Rue, who were again both using the same type of Voisin machine and motor, that it practically resolved itself into the winner being the aviator who was able to cut the corners of the marked out course closest. Ultimately Delagrange put up the best time of 1m. 18⅗s. for the kilom., beating De Rue's best time by 5 secs. The course was marked out by four posts outside which the flyers had to keep on taking the corners, each side of the course measuring 250 metres, and by the experience gained on the previous day it will be noted that Delagrange was able to better his time by no less than 22 secs. Rougier was again anything but at home on his machine, and during his attempts got very little away from the actual starting line. De Rue's best time for the kilometre was 1m. 24s., and although he attempted upon that occasion to fly for the second circuit without descending, before he had completed this he re-alighted on the ground. M. Delagrange was therefore the winner of the Stern prize of 1,000 francs, which goes to the aviator who has flown the fastest circular closed kilometre by June 3rd.

KITE FLYING ASSOCIATION OF GREAT BRITAIN.

THIS association is pushing along in a very useful direction in organising competitions as indicated by its title. The next will take place on Wimbledon Common, on Saturday afternoon, July 3rd, when the President's Challenge Cup will be awarded, and a boys' competition contested. The following are the rules for the President's Challenge Cup, for best kite of the year, open to members only, amateur or professional.

1. Competitors may submit kites of any kind and size. The kites will be raised simultaneously by the competitors, each kite having a cord or wire 100 to 400 yds. long, the length to be fixed by the judges. The cord or wire may be of any size or kind.

2. Competitors must note that competition will last one hour, and if the kite falls to the ground during that time it will be disqualified.

3. The judges will measure (1) the surface, (2) weight, (3) angle of kite.

4. The judges will take note of the stability of kites.

5. Classification will be made in the following manner:—2 marks for angle of kite, 2 marks for stability, 1 mark for portability, 1 mark for strength and construction, 1 mark for weight for area.

Rules for the first of a series of boys' competitions for prizes given by Col. H. S. Massey, C.B., F.R.G.S.

Weight Lifting. Prizes (value), £3, £2, £1. Entrance Fee, 1s.
Age, 14 and under.

Competitors may submit any kite, either home-made or manufactured, and in any shape or size.

The kites will be raised simultaneously by the competitors, each kite having a cord 100 to 400 yards long, the length to be fixed by the judges on the ground. The cords can be of any size or kind.

Competitors must note that weight must be lifted for 15 minutes.

The judges will measure (1) the surface, (2) weight.

Three prizes if not less than ten starters.

Competitions will he held later for best-designed kite made by lads, for prizes to value of £20.

Entry forms may be obtained from W. H. Akehurst, hon. sec., 27, Victory Road, Wimbledon, S.W.

AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Fixtures for 1909.

June 12 ... "Point-to-Point" Balloon Race, Hurlingham Club (Cup presented by the Hon. Mrs. Assheton Harbord).

July 10 ... "Hare and Hounds" Balloon Race, Hurlingham Club (Cup presented by the Hon. C. S. Rolls).

Balloon Race, Hurlingham. Point-to-Point Race (Cup Presented by the Hon. Mrs. Assheton Harbord).

This race will take place at the Hurlingham Club, Fulham, S.W., on Saturday, June 12th, at 3.30 p.m.

Members of the Aero Club will be admitted to the Hurlingham Club free on presentation of their Aero Club Membership Cards.

Members of the Aero Club can obtain special tickets for the admission of their friends, who are not members of the Aero Club, to Hurlingham, from the Secretary of the Aero Club, price 10*s.* each.

The following rules will govern the competition :—

1. Open to Members of the Aero Club of the United Kingdom, who need not necessarily be in charge of the balloon.

2. A competing aerostat must be in charge of a member possessing the club aeronaut's certificate, or a member who has made at least twelve ascents.

3. A competitor must not be accompanied by a professional aeronaut. The term "professional aeronaut" shall not be deemed to include officers connected with the military ballooning establishments of this or other countries.

4. The winner will be the competitor who lands nearest to a point which he will select before starting.

5. The point selected must be outside a radius which will be fixed by the Race Committee not less than one hour before the time of starting. (Note.—Bacon's Cycling Road Map, "Fifty Miles Round London," will be used by the Committee in fixing the radius.)

6. The point chosen by a competitor must be an intersection or junction of roads clearly marked on any "half-inch to the mile" map.

7. Each competitor must hand his map so marked to the Secretary for verification half an hour before the time fixed for starting.

8. There is no restriction as to size of balloon or number of passengers carried.

9. A proper anchor, anchor-rope, and trail-rope must be taken, and may not be dispensed with at any time.

10. Competitors are required on landing to properly fill in a Landing Certificate, which must be obtained from the Secretary beforehand, and this Certificate should contain such full particulars as will enable the Committee to easily locate on an ordnance map of half an inch to a mile the exact point at which the descent was made.

11. The Landing Certificate must be signed as correct by the Competitor and others (if any) accompanying him, and two responsible persons present at the time of final descent, and must be sent in to the Secretary within 24 hours of landing.

12. Competing aerostats may not be dragged, except at the final descent for convenience in packing; in the latter case the distance for the purpose of the competition will be measured only up to the point at which such dragging commenced.

13. Temporary descents will not be permitted.

14. A competitor by entering thereby agrees to accept responsibility for damage done by his balloon or the occupants, and to indemnify the Aero Club of the United Kingdom and the Hurlingham Club in respect thereof.

15. The Aero Club streamer must be attached to each balloon.

16. The Committee of the Aero Club will have power to cancel or postpone the event owing to weather conditions or other cause.

17. A competitor by entering agrees to be bound by these rules, and a competitor who does not strictly comply with the rules will be liable to disqualification.

18. The decision of the Committee of the Aero Club of the United Kingdom in all matters of dispute, or as to the interpretation of these rules, will be final.

Members desiring to compete are requested to advise the Secretary on or before the 9th June, 1909. Entrance fee, 10*s.*

Gas.

Gas will be supplied to competitors at 2*s.* 5*d.* per 1,000 cu. feet.

Trailing.

In view of certain representations which have been made to the Committee of the Club respecting trailing, they deem it advisable to draw the attention of competitors to the fact that trailing, unless very carefully conducted, is likely to do considerable damage to property, and thereby bring ballooning into discredit. The Committee, therefore, hope that all competitors will take particular care only to trail in suitable country, and to at once rise when there is any likelihood of a rope doing any damage.

Shellbeach Flying Ground.

Erection of Sheds.—Members wishing to erect their own sheds at Shellbeach are requested to apply to the Secretary, who will supply all information.

Sleeping Accommodation at Shellbeach.—In order that the Committee may have some idea of the demand for sleeping accommodation at Shellbeach during the ensuing season, Members who are likely to require such accommodation are requested to notify the Secretary of the Aero Club forthwith. It is not necessary to specify any particular date at present, the object of this notice merely being to ascertain the probable demand for rooms.

Golf Course at Shellbeach.—The Committee of the Aero Club have under consideration the advisability of acquiring the golf course which immediately adjoins the flying ground at Shellbeach. Golfing members are therefore requested to notify the Secretary at once if they are likely to make use of the course, so that the Committee may have some idea as to what support will be forthcoming.

Railway Arrangements.—The following reduced fares have been arranged with the railway company for members visiting Shellbeach :—

1st Class Return	2nd Class Return	3rd Class Return
8*s.*	6*s.* 6*d.*	5*s.*

These tickets will be available for one month from date of issue.

Members desiring to avail themselves of these reduced fares are required to produce vouchers at the booking offices. Vouchers can be obtained from the Secretary of the Aero Club.

Trains leave Victoria, Holborn, or St. Paul's.

For the convenience of members, the best train is the 9.45 a.m. from Victoria, arriving at Queenborough 10.55. At Queenborough change to the Sheppey Light Railway for Leysdown (Shellbeach), which is ¾-mile from the flying ground.

The Club House, Muscle Manor, is now open to members, and refreshments can be obtained there. Until the ground is being regularly used it is, however, advisable to send a telegram so that arrangements may be made. Telegrams should be addressed "Aero Club, Shellbeach, Eastchurch."

Hurlingham Club and the Aero Club.

Members of the Aero Club may be elected Associate Members of the Hurlingham Club on very favourable terms. Full particulars can be obtained on application to the Secretary of the Aero Club.

HAROLD E. PERRIN, Secretary.

166, Piccadilly, W.

OUR READERS' MODELS.

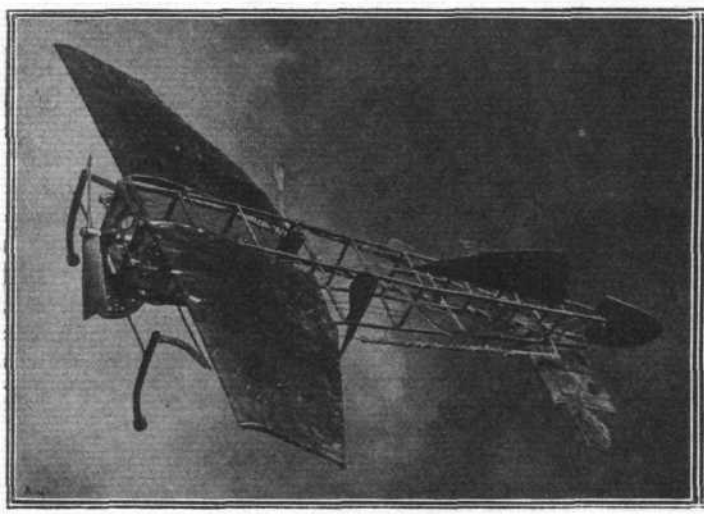
MANY of our readers contribute to their knowledge of flight by the construction of small working models. As in many cases these may be helpful to other students of the problem, we propose, as opportunity serves, to publish at this early stage of the science descriptions of these with illustrations. The particulars given below have been received from Mr. Philip Waterhouse, who explains this model of his own making as follows :—

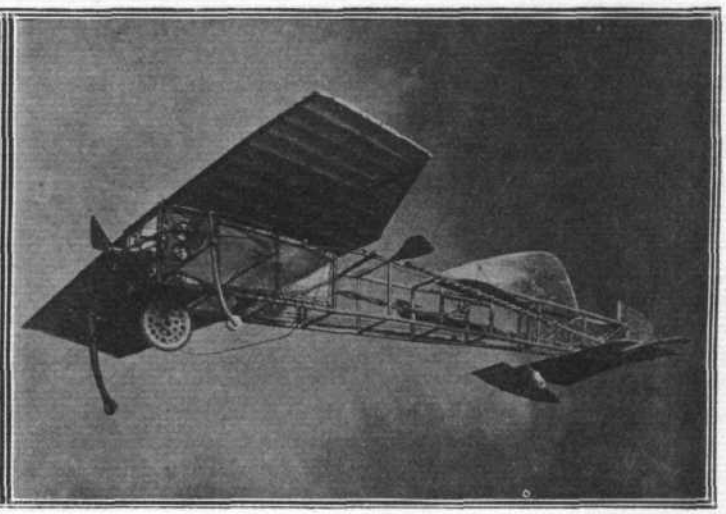
"This model was made with the object of testing the practicability of several supposed novel features, as follows :—

"The rear movable tips are operated from the driver's steering-wheel, and work in conjunction with the vertical rudder, the idea being that quicker turning can be effected by this method. Horizontal adjustment is the planes as in the case in several of the French monoplanes. This idea is given with apologies to Captain Burgeat, an illustration of whose machine appeared in your issue of April 24th, and whose alighting mechanism appears to be much on the same principle as my own. The rear alighting wheel, which is in the shape of a castor, is fitted with a shock absorber, as also the vertical rudder, which, in addition, has a guard to prevent it from being damaged.

"The elevator planes which are at the rear of the machine are worked by a lever from the driver's seat.

"The propeller is driven by elastic from a direct drive, but in order to get more thrust whilst the power in the elastic was available, I fitted two extra propellers and two extra lots of elastic which drive through universal joints





secured by a pendulum seat after the Koechlin-Pischoff method, which depresses the flexible rear edge of the front planes. The movable tips attached to the rear plane are intended entirely for steering purposes, in which manœuvre the vertical rudder assists, and the flexible rear portions of the front planes are used solely for lateral stability and are automatically operated by the driver's seat.

"The alighting arrangement is designed with the object of enabling the experimenter to raise most of the weight of the machine off the ground, and yet to keep the machine trimmed. The first shock of alighting is taken by the wheeled runners, which are attached to an outrigger from the chassis, thus the shock of alighting is taken by the strongest part of the machine instead of by on to pulleys which in turn drive on to the front propeller through belts (one being, of course, crossed), thus gearing it up considerably. This is not, of course, a good mechanical job, but it may be of interest as it enabled me to get the extra power into the space sufficient to propel the model along the ground for a short distance, which enabled me to test the turning effect given by the rear tips and vertical rudder working in conjunction with satisfactory results.

"The wheels and fittings are all of aluminium, the framework being of seasoned ash.

"The curvature of the planes is from Sir Hiram Maxim's formula, and the planes are covered with a light fabric and varnished, the shape being that which by experiment I have found to be most effective."

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Aero Club Challenge Cup.

ON Saturday last, May 29th, Mr. A. M. Singer, accompanied by Mr. Jacques Faure and Mr. George Thursby, in the balloon "Condor," started from Messrs. Short Brothers' Works at Battersea and descended about ten miles from Ostend. This voyage was made in connection with the Aero Club Challenge Cup, presented by Mr. John Dunville, for the longest trip during the current year.

Prizes for Essays.

MR. H. MASSAC BUIST has offered to the Aerial League of the British Empire a prize of five guineas for five successive years for the best essay not exceeding five thousand words, concerning the respective states of efficiency of the aerial fleets and aeronautical establishments of the leading countries. The essay must be written by a member of the League, and sent in on or before January 31st, 1910, when the first prize will be awarded. Further particulars can be obtained from the Secretary of the League, Staple Inn Buildings, High Holborn, W.C.

Wright Brothers at White House.

ON Thursday next the Wright Bros. are to visit the White House to receive from President Taft the Gold Medals awarded to them by the Aero Club of America. It is possible they may make some flights in the grounds of the President's official residence.

THE BUILDING OF A FLYER.

BEING SOME OBSERVATIONS ON THE SUBJECT OF THE DESIGN AND CONSTRUCTION OF FLYERS AND GLIDERS, WHICH SHOULD BE BOTH INTERESTING AND HELPFUL TO AMATEURS.

MANY an enthusiastic reader must be desirous of obtaining the necessary data and instructions to enable him to build some sort of a flying machine on his own. Some may be content with models, others may think a glider would meet their requirements, but the more ambitious will have nothing short of a full-fledged flyer with engine equipment. Curiously enough—seeing that the science is only just born—quite a number of people appear to regard the problem as already cut and dried, and are apt to feel agrieved with any printed article that does not actually give chapter and verse concerning at least one specific type of practical design. It is, therefore, perhaps as well for us to disclaim the possession of any superhuman knowledge on the subject, even though we hope, in what follows, to be successful in giving some interesting and instructive information that is very much to the point.

Our Willingness to Help.

The science of flight is so little developed that it is impossible to give very much numerical data which has been substantiated by practice. That is to say, any sort of complete design which we might evolve for the purpose of "spoon-feeding" those without the initiative of designing for themselves, would essentially at the present day contain many unknown quantities, for which we could offer no guarantee and but little assurance of success. Then there is the other side of the question, which is governed very largely by the capabilities and facilities for work possessed by the amateur who is prepared to execute any such design. Because it is possible, and in some ways preferable, to make a flying machine of wood, many people seem to imagine that the building of such a machine is therefore essentially within the amateur's province, but as a matter of fact such is not necessarily the case. We do not in any way wish to imply that the actual building of a flyer is not less complicated than that of a motor car, for instance, or that the possibility of making it in wood does not very materially alter the problem from the amateur's point of view, but what we do mean is this, that a design suited to a factory engaged in aeroplane construction does not necessarily lend itself to being properly carried out by anyone only possessed of the limited facilities of the average home workshop. It follows, therefore, from these two considerations that there is no useful purpose whatever in providing a cut-and-dried design for amateur requirements, because anyone to whom they might appeal will be much better advised to rough out a design for himself, and he should feel a far greater satisfaction in knowing that he is the author of the whole thing from start to finish. Knowing his own resources and capabilities, he can evolve details to suit his constructive ability, and thus produce a machine about which he will really know the why and wherefore of every part. In this work we are only too willing to be of such assistance to our readers as we can, for we do not doubt that many who begin in this way will end by becoming enthusiastic followers of the sport.

Timber and its Choice.

Questions upon which we can initially be of some service resolve themselves under two headings, those relating to materials and those relating to dimensions. In both it is at the present day, as we have already explained, only possible to give approximations. So far as the material is concerned, we may assume that wood is to be employed for the entire framework, and the question at once arises as to what wood is the best. If a reference book on the subject of timber be consulted, it will be found that a certain number of trees produce timber which is both light and strong, but it is not alone sufficient to have mere figures of this sort; practical knowledge of timber and the peculiarities of different kinds is essential for success. For instance, Short Brothers, who are building the Wright flyers in England, use nothing but spruce, while the Voisin machines are constructed of ash. Now spruce is a wood which is lighter and stronger than ash, but, as a rule, it is a timber blemished by a number of knots. To obtain a sound spruce spar of 15 feet in length is a matter of considerable difficulty; in fact, the sources which Messrs. Short Brothers themselves tap for their supply extend all over the Kingdom. It may be mentioned here, as it is an important factor in connection with flying machine construction, that a length of 15 feet in one piece is an outside size, and therefore both more expensive and more difficult to obtain. Lengths of 12 feet may be taken as the maximum in which it would be easy for anyone outside the trade to get ready delivery, and this fact in itself has an important influence on the design, as it naturally determines the number of splices which have to be made in order to build up the full spar length for a given span.

The Flexibility of Ash.

Ash, as a timber for the construction of flyers, is mainly characterised by its flexibility. It is eminently suited for members which are expected to bend, and it is for the same reason less useful where rigidity is required. It is not so strong for its weight as spruce, and consequently the tendency which a designer has to cut down dimensions when using it, is very liable to result in emphasising its bending propensities in practice. In Mr. Moore-Brabazon's "Bird of Passage" there has been noticed a distinct bending of the main spars between the upright struts separating the two decks, and yet these struts are only about 6 feet apart. One of these lengths, which has been broken, has been replaced by a piece of spruce 1½ ins. wide by 1 in. deep, and bearing in mind that the length between the struts is about 6 feet, and that the full load of the machine is, say, 1,400 lbs., this may give some sort of a guide as to dimensions. It is a matter of some doubt, of course, as to what is the amount of the actual load which such a member in the machine has to carry, but it is only by trial and error that sufficient stiffness is ultimately obtained for the least possible weight.

Importance of Selection.

For the construction of gliders, which may properly be regarded as flying machines in which the motive power is "gravity," it might doubtless be advantageous for an amateur to decide upon pine instead of either spruce or ash. It does not possess the desirable qualities of the other woods, but on the other hand it is easier to select good specimens, and in selection rather than material lies the secret of success. Beyond the two general rules of avoiding knots and preferring a reasonably straight grain,

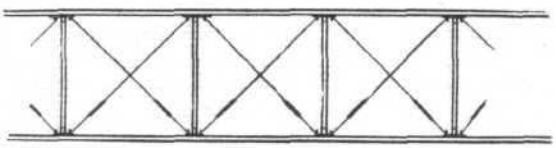
it is difficult to convey any written assistance in the selection of timber, for it is one of those arts which can be purchased only by experience.

Bamboo and its Drawbacks.

An alternative to wood much in favour with amateur constructors is bamboo, but of this material it is only possible to say that the chief point in its favour is that it is "ready-made"—and like most ready-made articles is generally a bad fit. A bamboo spar needs no preparation, and conversely it cannot be easily prepared, which is an objection almost completely neutralising its initial advantage owing to the difficulty which it involves in making suitable joints and fastenings. For certain things, as for instance kites, bamboo is most suitable, and for special designs of glider it might also be used, but on the whole it is most difficult to make a good job of bamboo construction, and any initial saving of labour is likely to be found more apparent than real before the end.

The Use of Piano Wire.

Assuming the biplane type, the top and bottom spars representing the front edges of the two decks are, of course, braced together on the usual system by vertical struts and diagonal piano-wire ties, the latter being, say, about 19 gauge. This system of construction nominally makes all the wood members "struts," but the natural weight of the decks themselves puts the top members



A biplane is made strong by using vertical struts and diagonal wire ties.

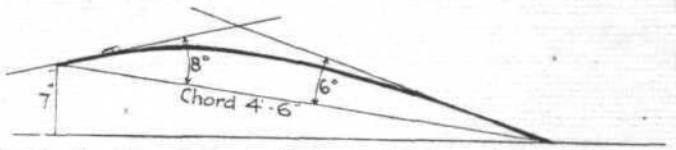
in tension when the machine is at rest, and when in flight this condition is reversed. This, of course, applies only to the structure as a whole and its capacity for resisting bending as a whole: if the portion of the load which comes upon a length of spar between any two struts is sufficient, then, of course, that part will bend independently of the rest, and it was this which took place in the case mentioned above.

Rigidity and Flexibility.

It is important, when considering the design of a flyer, to bear in mind the distinction between flexible and rigid types of construction, and the flexibility which results from inadequate strength. The Wright flyers, for example, are essentially of the flexible type. They are meant to bend under the shock of landing, and at other times when unduly stressed, but individually their elements are supposed to be sufficiently strong to remain rigidly in the required shape. It is very important, for instance, that the camber of the surfaces should be properly maintained in flight, and for this purpose it is necessary to adequately stay the surface material with ribs, the size of which depends, of course, upon their spacing. As it is necessary to bend the ribs in the first instance, ash is a very suitable material for this purpose, strips having a section of, say, $\frac{5}{8}$ by $\frac{3}{8}$, being readily bent in the steam from a boiling kettle. It is, of course, necessary to bend the ribs strictly to shape, and some sort of template must be used as a guide. It is also essential that each rib should be clamped down with its proper curvature while it sets after steaming.

The Curvature of the "Planes."

As to what curvature is best it is impossible to say, as the correct relationship between the dipping angle of the front edge and the trailing angle of the rear edge has not yet been determined. Moreover, it is necessary to elevate the front edge above the rear edge, and this amount is also uncertain. Messrs. Short Brothers have very kindly suggested 7 ins. as being worth trying on a



The front edge of an aerofoil must be raised above the rear edge; plausible dimensions are given above.

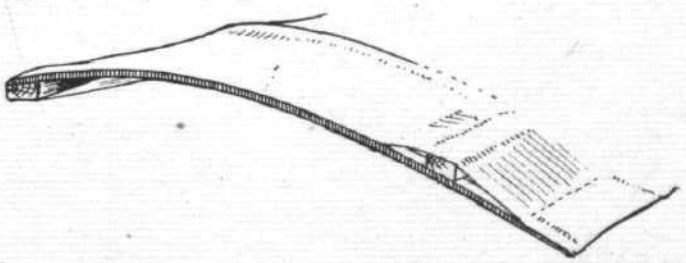
full-sized machine in which the aerofoil surface subtends a chord of, say, 4 ft. 6 ins. Similarly they have been good enough to give the values 8° and 6° as plausible angles which a tangent to the front edge and a tangent to the rear edge might make respectively with the said chord. The filling in of the curve joining these two points must be left to individual taste, as also must be the method of fastening the surfaces.

Single and Double Surface.

For the surface material, one of the rubber-proofed fabrics already on the market should certainly be employed, unless, of course, the designer is building the

When the decks are double surfaced the ribs are constructed to surround the spars.

machine with the object of trying some special material of his own. In the design of the decks, there are two alternative types, which result either in a single surface or a double surface. The former is the simpler method of construction, as it only involves a single layer of fabric, which should, of course, be applied to the under side of the ribs. The ribs themselves, however, should not in this case be left bare, but should be carefully covered with strips of fabric, so laid on as to avoid sharp angles in any direction. This also applies to the spars at the front and rear edges, which should be covered in a similar manner, so as to give them the appearance of a wedge-like section. It is for this reason



When the decks are single surfaced the ribs and spars must be covered to avoid sharp angles.

that the ribs are allowed to project behind the rear spar, so that the deck may trail off into the sharp edge. In the double-surface method of construction, the ribs themselves are more elaborate, and have to be built up in order to ensure strength with lightness. Their top and

bottom members pass above and below the spars, which are thus entirely enclosed, so that both surfaces of the deck have a perfectly smooth contour.

Area Required for a Given Weight.

The extent of the surface required for a given weight depends upon the speed of flight, and some idea of the figures which might be realised, if the practical conditions agree with Mr. Lanchester's theoretical hypothesis, will be found in a table which appeared in FLIGHT, page 297. Merely as a practical figure to begin with, however, a lift of 2 lbs. per square foot should not over-estimate the lifting capabilities of a machine travelling through the air at a speed in the order of, say, 35 to 40 miles an hour. Better effects ought to result from decks of relatively greater span than from those in which the "aspect ratio" (*i.e.*, the ratio between the span and the chord or fore-and-aft dimension) of the surface is small. As in most practical machines, however, the absolute dimension itself is an important limiting factor, and apart from the unwieldiness of large spans, there is apt to be constructional difficulties in the way exceeding values such as 40 feet which are now employed. In practice a reasonable aspect ratio seems to be about 5, although by special design and under special circumstances it might be possible to exceed this value. In any case the requisite area seems to involve the biplane system of construction except very high speeds are indulged in so as to make a monoplane possible.

The Area for a Glider.

That which has already been said applies in the main to the glider as well as to the flying machine proper, except that an allowance of half a pound per square foot of supporting surface would be more in the nature of a proper estimate, since the speed through the air would hardly exceed 20 miles an hour. This speed is made up by a head-wind of, say, 15 miles an hour, which is perhaps the strongest that it would be safe to experiment in, and a velocity relative to the earth of 5 miles an hour, which is about as fast as a couple of men running could succeed in launching a machine.

Tails and Elevators.

By itself an arched aerofoil is quite unstable in flight, and needs some sort of device to ensure safety. Lanchester has shown that, assuming the conditions of a certain hypothesis as defining the conditions of the atmosphere, it is possible to convert an arched aerofoil into an automatically stable flying machine by the addition of a suitable tail member. The practical exemplification of this system may be seen in the Voisin flyer. Wright, on the other hand, disregards the artifice of a tail and relies upon hand manipulation of an elevator for the mastery of his machine. A similar member also, it should be noted, exists in the Voisin type.

The "elevator," although conveniently so called, has not a great deal to do with ascent. In fact it has nothing at all to do with continuous ascent, because that alone is the outcome of an increased development of power beyond that necessary to sustain horizontal flight. The elevator is initially a controlling device for damping out oscillations, but conversely, it can be used to produce them, and thus serves a useful purpose as a means of making the flyer "jump" an obstacle. Its manipulation disturbs the distribution of pressure, and it is thus a means of performing a number of useful operations which come within its scope. The correct size for an elevator is doubtless susceptible of theoretical solution on the basis of a suitable hypothesis, which may or may not define the practical conditions, but it is obvious that practice is the only reliable guide in this matter at the present time, and it is on such details as these that the early experience of pioneers becomes invaluable. An area in the order of one-seventh or one-eighth of the area of the main surfaces would seem to approximately define the size in use on practical machines to-day, but the best size for any particular model could only be determined by experiment, and the same applies to the distance at which it should be mounted in front of the machine.

Use Strong Outriggers.

One point on which a warning may be given in this connection is to make the outrigger framework strong enough. It is very difficult to say what is the magnitude of the severest shock that the elevator has to withstand, but there is not the least doubt that the pilot's safety depends more on that member than any other, and a liberal allowance of strength should be made. An outrigger is the kind of member which is probably only just strong enough when it begins to look too strong. On the Short flyer, where the elevator stands out about 8 ft., spars $2\frac{1}{4}$ ins. by $1\frac{1}{4}$ ins. have been introduced into the outrigger framework. One reason for making this part of the machine as strong as possible is because it is very liable to suffer through the shocks of landing.

As to the dimensions and position of tail, if it is decided to use one, the details can only be established by experience. It is unquestionably a very tricky member to get quite right. Under certain conditions it may be inclined to interfere with starting, and possibly also with manœuvring in the air. It increases the moment of inertia of the machine about the transverse axis, and conversely it affords a leverage through which a locally adverse gust might conceivably have an unpleasant effect upon the machine as a whole.

Power Required for Flight.

There remains in this cursory, although not very brief, review of the building of a flyer, the question of motive power and propulsion. In the case of a glider the motive power is gravity, and the course of flight always inclined towards the earth. The designer's object will therefore be to construct a machine with the least possible resistance, so that the energy available, represented by his launching altitude, will carry him as far as possible before he touches the ground.

On a motor-driven flyer the object is to overcome the gravity attraction and to sustain flight indefinitely in a horizontal path. Once again, however, the machine having the least resistance (which as a glider would have travelled furthest) will require least power, and that is why gliding experiments are so useful and instructive, as they provide so much direct light on this somewhat abstruse problem.

The Three Load Units.

In any case, however, whatever the resistance may be, it is always permissible to express it as a fraction of the total weight. The weight is made up in the main of three parts, (1) framework, (2) power-plant, (3) pilot. Of these, nothing but the weight of the pilot is initially fixed, for the weight of the framework depends upon the weight of the engine, which in turn is governed by the total load itself. The only way to commence is to start

by guessing, and then follow on by modifying the values chosen until a reasonable agreement is obtained.

A full-sized machine of the Voisin type may weigh 1,400 or 1,500 lbs. fully loaded, but then, on the other hand, there is no reason to suppose that a successful flyer could not be built weighing only a fraction of this amount, perhaps as low as 400 lbs. It depends so much on engine development, and the skill with which the framework is constructed.

Co-efficients of Traction.

As to the power required, there is no very certain figure which can be used as a basis. The exact value will, of course, vary with each machine. It is reasonable for the purposes of estimation, however, to take the co-efficient of traction as equivalent to one-sixth the total weight, in which case a machine weighing 1,500 lbs. would need a thrust of 250 lbs., and one weighing 400 lbs. would need a thrust of just under 67 lbs. Such evidence as is available seems to show that this is well outside practical achievements, but it is important not to under-estimate.

The horse-power is derived from the thrust by multiplying by the speed of flight. Thus a thrust of 250 lbs. sustained at 40 m.p.h. is equal to 10,000 mile-lbs. per hour, which in turn is equal (dividing by 375) to nearly 27 h.p. This represents the net energy represented by flight under the assumed conditions; it is, of course, necessary to allow for losses in the transmission of that energy. There will be losses in the mechanical transmission itself, and in the propellers, but where so little is known, it is reasonable to take some round figure, such as 50 per cent., which results in multiplying the net horse-power by two in order to find the size of the motor required. In the case under consideration, the estimate would obviously be for a good 50-h.p. engine. Similarly, at the other extreme of the scale, where we have assumed a total load of 400 lbs., with a thrust of 67 lbs. at a speed of, say, 35 m.p.h., this would represent $6\frac{1}{4}$-h.p. or, say, a good 12-h.p. engine as a suitable estimate for the job. It will be observed that the small value in this latter instance lends a certain fascination to this aspect of the problem of flight.

Reserve Power for Ascents.

In the foregoing, no account has been taken of the reserve of power required for ascent. It is a factor of which it is extremely difficult to take note, and at the present stage of the art, when the majority of experimenters would be satisfied with achieving horizontal flight, at any rate for a start, it becomes a moot point whether a special allowance should be made initially if by doing so the whole prospects of a certain type of machine are upset.

To discard any such allowance is not necessarily ignoring the importance of this factor in the problem. It is merely placing a very proper faith in the designer's and constructor's skill to come well within allowances already estimated. Any power which can be saved over and above that necessary to horizontal flight is available for ascent, and if the designer has any reliance in his figures at all he will naturally anticipate a reserve of a few horse-power if everything goes through as he wishes. If he meets with unexpected difficulties, then the possible reserve may be swallowed up, and the machine not be altogether a success. But, on the other hand, neither is a machine altogether a success when a designer decides to instal an engine which is bigger than he really wants in the first instance.

Propellers.

Of the propellers and their design and construction we do not propose to say anything in this article, except that of all parts of the flyer they must be as good as it is possible to make them. The propeller is, on the whole, a job which no amateur need be ashamed to "put out," for not only will faulty construction spoil all chances of success, but if characterised by weakness as well, will be a grave source of danger to the experimenter.

Launching.

The question of launching, too, is one a little outside the scope of the present article. It is, of course, an important factor to be decided at an early stage in the design, as it is likely to affect the total weight of the machine. The governing factor is, of course, in the main the nature of the ground which it is proposed to use as an aerodrome.

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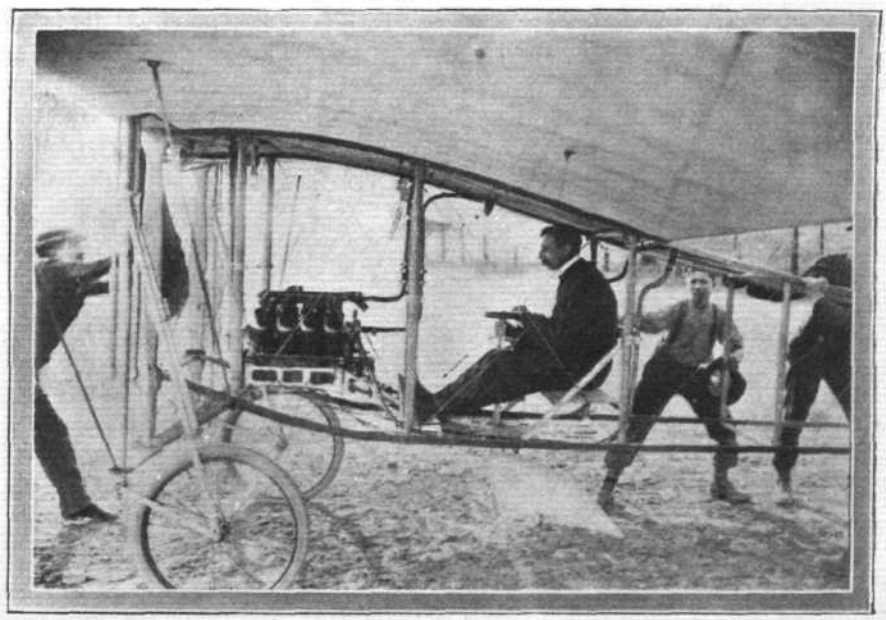
BLERIOT'S LATEST FLIGHTS.

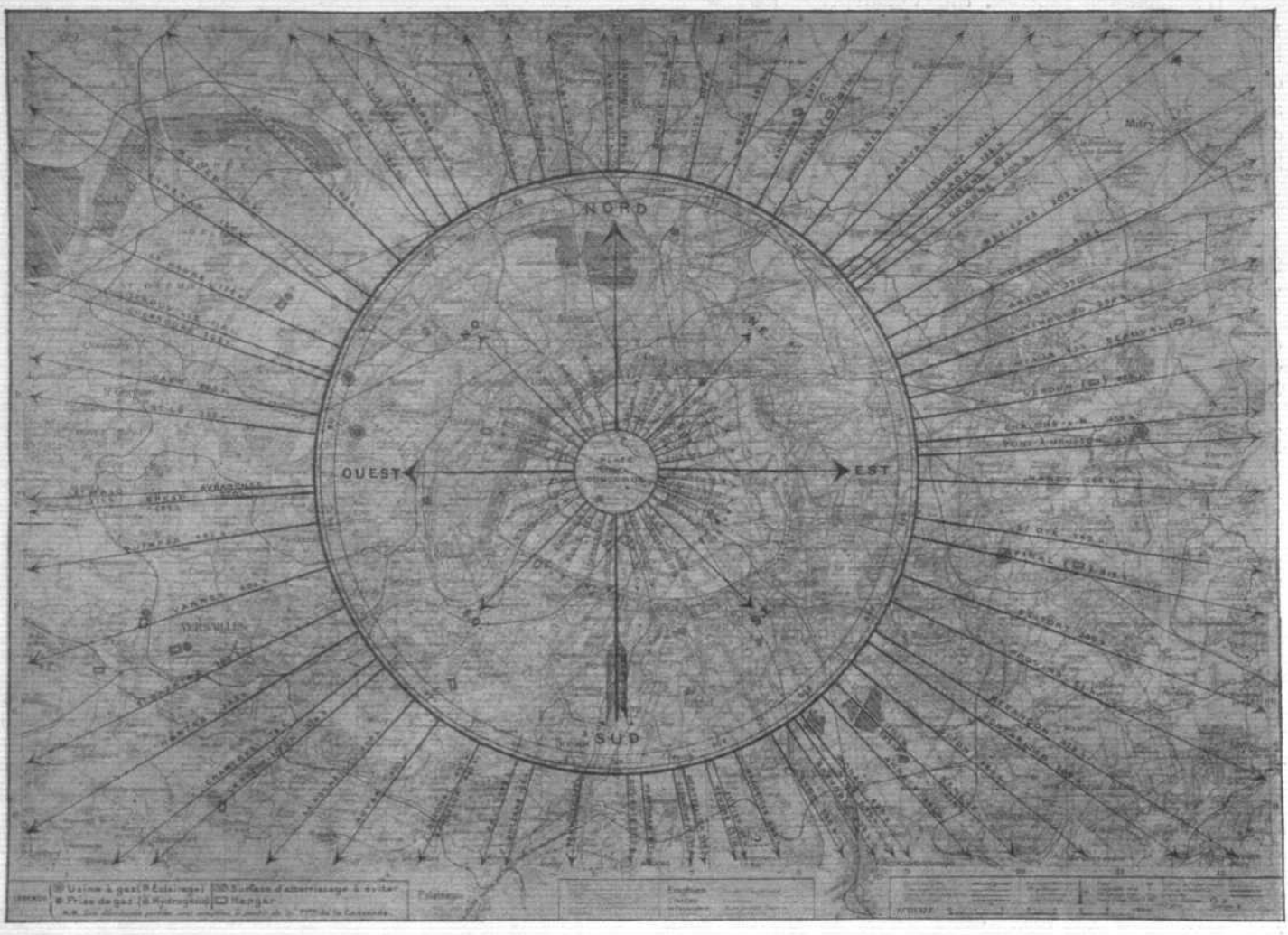
By way of celebrating the inauguration of the Bleriot monument, which has been erected at Toury in commemoration of the cross-country flight of M. Bleriot on October 31st last year, and illustrated in last week's FLIGHT, this intrepid aviator proposed to repeat his flight from point to point on the day of honour. Unfortunately, *en route* he ran short of petrol, with the result that after accomplishing 14 kiloms. of the distance between Toury and Artenay and back, he had to cut short his flight at Chateau Gaillard, a great disappointment both to himself and those associated with the erection of this memorable monument.

On the Friday previous, M. Bleriot had flown at Issy with his small monoplane No. XI, a distance of 4 kiloms., during which, whilst quite near the ground, he made some remarkable turnings and graceful curves.



View of the new Bleriot Monoplane, showing the disposition of aviator, motor, &c., and the curvature and struts of the main frame.

A GUIDE MAP FOR AERONAUTS.



Aviators' Map of the directions out of Paris to be taken for various destinations.

SOME long time back we published a rough drawing of a map giving localities for the landing of aeroplanes, &c., in and around Paris. Messrs. George Philip and Son, Ltd., of 32, Fleet Street, E.C., now forward us a remarkable map, which they are publishing at *2s. 6d.* in England, of the routes and directions to be taken by aviators when leaving Paris. By means of large arrows, very clearly printed, the position of each main point is indicated, together with the distance, so that a direct line, wind and weather permitting, can be confidently steered for. This very up-to-date publication, needless to say, is of French origin, its original title being "Sorties de Paris a Vol D'oiseau," for the use of "Aeronautes et Aviateurs." It has the *cachet* of the Aero Club of France, and forms one of the "Cartes Guides Campbell" series.

The map is printed in five colours, is very clear and gives a vast amount of valuable information in the most graphic way for aviators and aeronauts. By permission of Messrs. Philip and Son, we reproduce this map upon a very small scale, from which its useful scope may be more readily appreciated.

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British Engine for Flyers.

IT is interesting to note the choice by a British aviator of a British-made engine for his next experiments. Mr. J. T. C. Moore-Brabazon has, we learn, just placed with the Green's Motor Patents Syndicate, Ltd., an order for a 50–60-h.p. "Green" engine. Since the Olympia Show, several detail alterations have been made in this engine with the object of adding considerably to its merits.

Aero Club Official Notices.

UNDER the official announcements of the Aero Club on page 330, several interesting details will be found in connection with the Assheton Harbord Cup, Shellbeach attractions, &c.

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BACK NUMBERS OF "FLIGHT."

THE publishers have pleasure in announcing that they have secured a few of the back issues of FLIGHT, and any of our new readers who may wish to complete their sets may obtain the first twenty-two numbers for *2s. 9d.* post free, from the Publishers, 44, St. Martin's Lane, W.C.

Pau Flying Season Closes.

ON Monday of this week, what may be termed the flying season at Pau came to an end with a fine flight at Pont Long by M. Tissandier, the aviator being accompanied on his Wright machine by one of his pupils, M. Schraeck, of Buenos Ayres. The flyer was afterwards dismantled for transfer to Juvisy, where, for the present, instruction work will be continued.

Four L.N.A. Prizes.

THE Commission Aerienne Mixte have just drawn up regulations for four of the 1,000 franc prizes which have been placed at the disposal of the Ligue Nationale Aerienne. Three of them—those presented by MM. C. Stern, Déjardin, and David Mennet—will be awarded to the aviators who make the best speed over a circular kilom. before June 3rd, Sept. 3rd, and Nov. 3rd next respectively.

A fourth prize, presented by M. Ambroise Goupy, will be awarded to the avaitor who flies for 5 kiloms. in a straight line outside a military camp or aerodrome.

An English Aero-Motor Co., Ltd.

FROM Mr. Frederick R. Simms we learn that his firm, Aero-Motors, Ltd., which now constructs the 50-h.p. six-cylinder Simms' aero-engines, and sells the Simms-Voisin aeroplanes in Great Britain, is busy with orders for engines. Among them is included one for Col. S. F. Cody, another for Mr. F. K. McClean for a Short aeroplane, a third for Mr. Martin D. Rucker for an aeroplane of new design, and a fourth for Mr. August Euler, of Frankfort, for a Voisin machine.

Experiments with "Parseval II."

ON Wednesday morning a series of experiments in elevating manœuvres were carried out with "Parseval II." A brisk south-westerly wind was blowing when the airship was brought out, and she rapidly rose to a height of about 4,200 ft. She was then brought down at full speed at a very acute angle, and successfully landed at the appointed place.

The Dirigible "Russie" Makes its Debut.

ON Saturday last for the first time the dirigible "Russie," built at the Lebaudy factory in France, and following the lines of the very successful "Republique" airship, made its first flight from Moisson. She was in the air for some 20 minutes, and then returned to Moisson without having used any ballast whatever. On Sunday she was again out, this time for about one hour's duration. The motor is a 70-h.p. Panhard, and during the ascents she carried seven passengers.

The Medura Flyer.

A YOUNG German inventor who has devised a flying machine of the flapping-wing type, had a somewhat extraordinary experience on the first occasion that he attempted to fly. Needing an open space as an aerodrome, he applied to the municipal authorities of Cronenburg, who allowed him to use a certain field, and thither he quietly transferred his machine on an apparently inauspicious occasion. By the time that he was ready to fly, however, he found himself surrounded by a crowd of curious sightseers, which was so extraordinarily dense—in both senses of the term—that he had no room to move without doing damage to his machine, and although he made an attempt to rise in the air, it was not unnaturally a failure. By no means disheartened, Medura is going to try again, and as his worldly position has not endowed him with any great surplus of wealth, it might not be a bad plan if he were to commence operations by "passing round the hat." We know of at least one country, at any rate, where such a proceeding would very effectively clear the field, and that would be something gained in his particular case.

A Balloon Trial Trip.

DURING the afternoon of Sunday week, after the entertainment of the competitors and others in the International Balloon Race at Hurlingham, Mr. Rolls made an ascent in the new balloon, "Esperance," constructed by Short Bros. for Baroness Heeckeren, of Paris. Mr. Rolls had as passengers the Earl of Clonmell, Hon. Mrs. Assheton Harbord, and Mr. C. F. Pollock, and after a fast run across London the balloon was brought down at Luddesdowne, seven miles from Rochester.

Long-distance Ballooning in France.

ON Saturday last the Aero Club of France carried through its long-distance ballooning competition. Thirteen balloons started, being divided into two classes according to their cubic capacity, those up to 600 cubic metres having to carry only the pilot, while those above 600 cubic metres and up to 900 cubic metres had to carry a passenger in addition to the pilot. The balloons started from the Aero Club's park at St. Cloud, Paris, and the winner in the first class was M. Alfred Leblanc, who brought his balloon "Cythène" down at Corneillan, not far from Pau and about 612 kiloms. from Paris. M. Henry Kapferer was next, in the "Astra III," his descent being at Toulouse, 588 kiloms. from the start. In the big class, the maximum distance made was 641 kiloms. by M. Ed. Bachelard in the "Oural," which came down near Orthez, the second being M. J. Delebecque, who piloted the "Oise" to Mont de Marson, 596 kiloms. from St. Cloud.

All that remains of the Sizaire-Mors airship, which was referred to by Mr. C. D. Clayton in a paragraph last week, and which ultimately came to grief on the Dunstable Downs after being apparently responsible for the various scare headlines in the Press.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

"ELASTIC MOTORS."

To the Editor of FLIGHT.

SIR,—Referring to the letters in your last issue, with respect to the models, the length of flight of Mr. Webb's models are good, but not uncommon. I have seen one of the larger (*not largest*) kind of Clarke's Flyers travel 600 ft. (200 yds.), and some have, I believe, travelled over 1,000 ft. The range of flight depends chiefly on the machine being so built as to travel swiftly (offering minimum resistance), and the elastic motor strand being long, so as to allow of many turns, some 250 to 300. The manner in which the power (torque) of the elastic increases with the number of turns is interesting. The following is the mean of several experiments:—Turns 15, 30, 50, 70, 100, proportional to 1, 2, 2·125, 2·25, 3. We thus see that the twisting force is by no means proportional to the number of turns, especially after a certain number of turns have been given. This is chiefly because the elastic has been twisted or stretched beyond the elastic limit. This is why new elastic, the first time it is used, gives sometimes as much as 20 per cent. better results than afterwards. The following are the times taken by a wooden screw one foot diameter to run down 30, 60, 90, 120 turns respectively, viz., 2·5, 3·5, 4·5, 5·5 seconds approximately. About 10 to 15 seconds appears to be the limit for swift-running elastic motor-driven screws. The length of flight, therefore, depends on an initial high speed by means of a suitable launching apparatus and the continuing of the same by means of strongly-driven and rapidly-rotating twin screws, and a small and efficient sustaining surface. The best rubber to use is the thin black $\frac{1}{16}$" to $\frac{1}{8}$" in thickness; as to the best place to get it consult a Trades Directory for list of rubber dealers, and get the nearest to *procure* for you, say, so many dozen yards. You should then get it fresh; never buy rubber that has been kept in stock. Keep it when not in use in the dark. Model flights in a large hall differ greatly, though not, of course, so much as out of doors. It is impossible to launch a model twice in exactly a similar manner. Moreover, for any particular flight the model is not in *quite* the same shape or condition as it was for the one before. To claim to have solved any question of aerial balance as applied to a full-sized machine by means of a small model is absurd, though the writer knows of a score who have done so. The conditions are totally different. I am glad to see from advertisements in last week's number that the Economic Electric Company have followed out my suggestions, and brought out an electric aeroplane motor.

Yours very faithfully,

Streatham, S.W. V. E. JOHNSON.

BRITISH INVENTIONS AND FOREIGN ENCOURAGEMENT.

To the Editor of FLIGHT.

SIR,—*Re* Mr. Holdsworth's idea about capitalists falling over each other to put money into an invention, this is the vision of a young inventor, and is seldom, if ever, fulfilled.

Just to show how anxious capitalists are to put money into an invention, I have pleasure in giving you an extract from a letter of a would-be investor. In the first place I have something to sell; my model was successful at the Aero Exhibition; the principle is good and sound; I have a ¼-size model to scale in course of construction, also well worked-out plans for the full-sized machine; minor details well worked out; engine design and plans partly finished; I am considered an expert in high-speed motor building; I have premises large enough in which to build the machine; I have a fair plant of machinery for engine building, in fact, machines could be built throughout in my own shop at an estimated cost of £350.

I think Mr. Holdsworth will agree that the above is something to show to an investor. Well, this is one of the magnificent offers to invest £50 in a company of £1,500 capital on the following conditions:—

(1) That the patent is perfectly sound and has not been anticipated in any way.

(2) That I be styled the constructor-in-chief of the aeroplane, or works manager, to guarantee the "investor" a first-class berth on the floatation of a larger company.

(3) That I am to be the first to use and thoroughly test the machine and when same has proved thoroughly safe and reliable, it is guaranteed that the "investor" is to be the second person to make a flight on the machine.

These are the terms of his offer. He no doubt forgot to insert the clause that if the machine was a failure his money should be returned in full.

I consider Mr. C. D. Clayton's letter, May 8th, *re* Foreign Capital, more than probable.

Yours respectfully,

Birmingham. ALFRED P. MAXWELL.

P.S.—Perhaps Mr. Holdsworth was thinking of foreign capitalists, evidently not English speculators?

EFFICIENT PROPELLERS—A CHALLENGE.

To the Editor of FLIGHT.

SIR,—I have read a great many letters and advertisements lately in the technical press by various propeller designers all claiming to have designed aerial propellers which are remarkably light and highly efficient. Now I think something ought to be done to find out whose propeller really gives the best thrust for a given weight and horse-power. I propose to set the ball rolling by backing my design against all-comers to the extent of £5, that it will give the best thrust for a given weight and horse-power.

It is a left-handed propeller made of metal, driven by ⅛-h.p. electric motor; although it weighs just under 5½ ounces, the thrust given runs into pounds. Anyone who takes up my challenge can make their propeller of any pitch, diameter, surface, or shape they fancy, it must be made of wood or metal, and not exceed 5½ ounces in weight without the boss, and not to be a copy of my design, the boss to fit a ⅜ shaft, the propellers to be tested on an ⅛-h.p. electric motor under equal conditions by some disinterested person. The challenge to remain open for four weeks from date of publication. In conclusion, I trust that some of the many sporting propeller experts will take me up at once and relieve me of my £5. Surely it is not a difficult matter for a man who knows his business to design and make a propeller which will conform to the above simple regulations. If my challenge is not accepted, I trust prospective buyers of propellers will consider my design before deciding to buy any which are advertised.

Yours faithfully,

WILLIAM COCHRANE.

MODEL FLYERS—A CHALLENGE.

To the Editor of FLIGHT.

SIR,—I have read with interest the description of Mr. Webb's wonderful machine by Mr. Wright.

Now I consider that my patented machine, No. 7205, 1908, is a fair sample of what a model should be, and if it could be arranged I should be pleased to fly in private competition against any machine at present on the market, either with the wind, against the wind, in a straight line across the wind passing over given points, or in a curve passing approximately over given points, the models not to carry less than 5 ozs. to the square foot of canvas. Such a trial as this would bring out the good points prominently of such a machine as Mr. Webb's, and might perchance teach others something, and I shall be pleased if you would insert this in your paper as a challenge against all comers, as it should be an interesting experiment, and prove the value of assertions made in a paper with regard to the peculiar properties of any particular machine.

Yours very truly,

June 1st. MONTFORD KAY.

CLOCKWORK MOTORS FOR MODELS.

To the Editor of FLIGHT.

SIR,—Referring to Mr. Angus's letter in your valuable paper, we beg to say that we have been experimenting for some time past with clockwork motors for driving model aeroplanes, and have now designed the lightest possible arrangement, using a very powerful spring, which we are placing on the market with a guaranteed thrust, and time of running, that may be useful to him.

We are also manufacturing all the various sundries required for building model planes.

Yours truly,

London. THE UNIT ELECTRICAL FIRM.

Aeronautical Patents Published.

Applied for in 1908.

Published May 27th, 1909.

9,970. V. HUMBERT. Flying machines.
20,095. W. F. HOWARD. Aerial toy.
20,694. A. F. J. DOUTRE. Flying machines or aeroplanes.